

Appl. No. 10/061,815  
Amdt. Dated March 5, 2004  
Reply to Office Action of November 6, 2003

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### Listing of Claims:

Claim 1 (original): A method for estimating distances to irregularities on a subscriber loop comprising the steps of

measuring a loop response as a function of frequency at a loop end,

weighting the loop response with a pre-selected prolate spheroidal wave function to produce a weighted response, and

generating a spectral analysis of the weighted response wherein the estimated distances to the irregularities correspond to peaks in the spectral analysis.

Claim 2 (original): The method as recited in claim 1 wherein the step of generating the spectral analysis of the weighted function includes the steps of

transforming the weighted function via a Fourier Transform to produce a transformed function, and

identifying the peaks in the transformed function to obtain the estimated distances.

Claim 3 (original): The method as recited in claim 1 wherein the step of generating the spectral analysis of the weighted function includes the steps of

transforming the weighted function via a Fast Fourier Transform to produce a transformed function, and

identifying the peaks in the transformed function to obtain the estimated distances.

Claim 4 (original): The method as recited in claim 1 wherein the loop response is the real part of the return loss of the loop with respect to a reference impedance and the step of measuring includes the step of measuring a swept-frequency signal proportional to the real part of the return loss.

Claim 5 (original): The method as recited in claim 1 wherein the loop response is composed of exponentially decaying co-sinusoids and the step of measuring includes the step of measuring a swept-frequency signal proportional to the loop response.

Claim 6 (currently amended): A method for estimating distances to irregularities on a subscriber loop comprising the steps of

measuring the real part of the return loss of the loop using a pre-selected reference impedance over a band of frequencies to generate a loop response,

weighting the loop response with a ~~spectral window~~ pre-selected prolate spheroidal wave function to generate a weighted loop response,

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iteratively multiplying the weighted loop response with a pre-determined multiplier function to produce a characteristic function,

transforming each iteratively produced characteristic function to determine a set of corresponding characteristic values, and

selecting local maxima from the set of characteristic values as estimates to the distances to the irregularities.

Claim 7 (cancelled)

Claim 8 (original): The method as recited in claim 6 wherein the step of transforming includes the step of Fourier Transforming the weighted loop response.

Claim 9 (original): The method as recited in claim 6 wherein the step of transforming includes the step of Fast Fourier Transforming the weighted loop response.

Claim 10 (original): The method as recited in claim 6 wherein the multiplier function is a co-sinusoidal function and the step of iteratively multiplying includes the step of incrementally selecting a new period for the co-sinusoidal function with reference to the length of the loop.

Claim 11 (original): The method as recited in claim 6 wherein the multiplier function is a co-sinusoidal function and the step of iteratively multiplying includes the step of incrementally selecting a new period for the co-sinusoidal function with reference to intermediate distances along the loop.

Claim 12 (original): The method as recited in claim 6 further including the steps, after the step of selecting, of

hypothesizing a set of loops having irregularities commensurate with the estimated distances to the irregularities, and

selecting one of the loops from the set by comparing the measured loop response to a corresponding loop response from the selected one of the loops.

Claim 13 (original): A method for determining a configuration for a subscriber loop comprising the steps of

measuring a loop response as a function of frequency at a loop end,

weighting the loop response with a weight function to produce a weighted response,

generating a spectral analysis of the weighted response wherein the estimated distances to the irregularities correspond to peaks in the spectral analysis,

hypothesizing a set of loops having irregularities commensurate with the estimated distances to the irregularities, and

selecting one of the loops from the set by comparing the measured loop response to a corresponding loop response from the selected one of the loops.

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Claim 14 (original): The method as recited in claim 13 wherein the step of weighting includes the step of weighting the loop response with a prolate spheroidal wave function waveform.

Claim 15 (original): A method for determining the configuration of a subscriber loop comprising the steps of

measuring the real part of the return loss of the loop using a pre-selected reference impedance over a band of frequencies to generate a loop response,

weighting the loop response with a spectral window to generate a weighted loop response,  
iteratively multiplying the weighted loop response with a pre-determined multiplier function to produce a characteristic function,

transforming each iteratively produced characteristic function to determine a set of corresponding characteristic values,

hypothesizing a set of loops wherein each of the loops in the set has a set of characteristic values commensurate with the set of characteristic values of the measured loop, and

selecting one of the loops from the set of loops based upon a comparison of each set of characteristic values of each of the loops to the set of characteristic values of the measured loop.

Claim 16 (original): The method as recited in claim 15 wherein the step of weighting includes the step of multiplying the loop response by a pre-selected prolate spheroidal wave function to produce the weighted response.

Claim 17 (original): The method as recited in claim 15 wherein the step of transforming includes the step of Fourier Transforming the weighted loop response.

Claim 18 (original): The method as recited in claim 15 wherein the step of transforming includes the step of Fast Fourier Transforming the weighted loop response.

Claim 19 (original): The method as recited in claim 15 wherein the multiplier function is a co-sinusoidal function and the step of iteratively multiplying includes the step of incrementally selecting a new period for the co-sinusoidal function with reference to the length of the loop.

Claim 20 (original): The method as recited in claim 15 wherein the multiplier function is a co-sinusoidal function and the step of iteratively multiplying includes the step of incrementally selecting a new period for the co-sinusoidal function with reference to intermediate distances along the loop.